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BULLETIN
OF THE
TORREY BOTANICAL CLUB

AUGUST, 1908

New West Indian *Lejeuneae*

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(WITH PLATES 26-28)

Students of the Hepaticae cannot help being impressed by the remarkable development of the *Lejeuneae* in tropical regions. Usually more than half of the species in any particular locality belong to this group, and many of the species are represented by numerous individuals. The *Lejeuneae* have become adapted to a great variety of external conditions. Some are true xerophytes and are able to endure desiccation for considerable periods; others cannot exist except in the constant shade of moist forests. Some grow on rocks or on the bark of trees, others are found only on living leaves, while still others carry on their entire development within the tufts of larger bryophytes. In all probability the group is essentially modern, and the species have acquired their great diversity of form and their manifold adaptations to peculiar modes of life within comparatively recent times.

The West Indies agree with other tropical regions in showing a large preponderance of *Lejeuneae*. In a series of papers on the Hepaticae of Puerto Rico * the writer has recently had occasion to describe and figure more than fifty species in the group, many of which have a geographical range extending far beyond the limits of this particular island. In connection with the specific descriptions the genera to which the species are referred are also discussed, and in several instances it has seemed advisable to propose new genera or to emend the characters of accepted genera as given by earlier writers. In the course of this study other West

* Bull. Torrey Club 29-35. 1902-1908.

[The BULLETIN for July, 1908 (35: 321-370. *pl.* 21-25) was issued 30 J1 1908.]

Indian *Lejeuneae*, not yet known from Puerto Rico and apparently new, have been distinguished, and six of these are described and figured in the present paper. One local species from the Blue Mountains of Jamaica is made the type of a new genus; the others belong to genera which have been discussed in connection with the Puerto Rico flora, and the reader is therefore referred to the series noted above for an account of the generic peculiarities. The type specimens of the new species are preserved in the herbarium of the writer, at New Haven, Connecticut.

***Trachylejeunea dilatata* sp. nov.**

Pale green, dull, scattered or forming thin depressed mats: stems 0.085 mm. in diameter, loosely adherent to the substratum, copiously and irregularly pinnate, the branches widely spreading, simple or sparingly subdivided, often with smaller leaves than the stem but not microphyllous: leaves contiguous to loosely imbricated, the lobe strongly falcate, obliquely spreading, convex, abruptly dilated from a narrow base, orbicular-obovate in general outline, 0.35–0.5 mm. long, antical margin decurrent by a single cell, straight or slightly incurved near the base, then strongly outwardly curved to apex, postical margin also outwardly curved, apex broad and rounded, rarely very bluntly pointed, margin denticulate from projecting cells except close to antical base; lobule inflated throughout, abruptly contracted in the outer part to a circular opening, ovate, 0.17 mm. long, 0.14 mm. wide, keel strongly arched, forming an angle of about 90° with postical margin of lobe, free margin curved and entire, revolute, meeting surface of lobe at about a right angle, apical tooth consisting of a slightly projecting cell, short and blunt, bearing the hyaline papilla in a slight depression on the proximal side, sinus straight or lunulate, forming with the apical tooth the greater part of the opening into the water-sac; cells of lobe averaging $15\ \mu$ at the margin and $35 \times 21\ \mu$ in the middle and at the base, postical surface plane or nearly so, antical surface varying from plane to convex and conical in passing from basal and median regions toward the margin, walls thin throughout or with very minute triangular trigones; ocelli none: underleaves distant, plane, orbicular, 0.12 mm. long, bifid to about the middle with erect, acute to obtuse divisions, mostly three or four cells long and three or four cells wide at the base, sinus obtuse, margin entire or subdenticulate from projecting cells, sometimes unidentate on sides, basal region cuneate: inflorescence autoicous: ♀ inflorescence sometimes borne on a leading branch, sometimes on a more or less abbreviated branch, innovating on one, rarely on both sides,

the innovations sterile or rarely again floriferous; bracts obliquely spreading, complicate, keel sharp but not winged, lobe oblong to obovate, 0.75 mm. long, 0.45–0.55 mm. wide, margin as in the leaves, lobule ovate-lanceolate, obtuse, 0.4 mm. long, 0.17 mm. wide, margin entire or nearly so; bracteole very slightly connate on both sides, oblong, 0.4 mm. long, 0.35 mm. wide, bifid about one third with erect obtuse lobes, and an obtuse or subacute sinus, margin vaguely and irregularly crenulate from projecting cells; perianth slightly exserted, ovoid, 0.6 mm. long, 0.35 mm. wide, cuneate toward base, truncate or retuse at apex with a short beak crenulate at the mouth, slightly compressed, sharply five-keeled in upper part, each keel bearing two denticulate wings, one or rarely two to five cells wide, surface otherwise smooth or nearly so: ♂ inflorescence occupying a short branch or terminal on a more or less elongated branch, not proliferating; bracts mostly in two to fifteen pairs, loosely imbricated, much smaller than the leaves, strongly inflated, slightly and subequally bifid, the lobes rounded and crenulate at the apex, keel strongly arched, crenulate; antheridia in pairs: capsule about 0.2 mm. in diameter; spores irregular in form, about 12 μ in short diameter, greenish, minutely verruculose. (PLATE 26, FIGURES 1–13.)

On leaves of ferns. Jamaica: Mabess River, *Maxon* (1544), *Evans* (311). Dominica: Laudat Mountain, *Lloyd* (102). The specimens collected by the writer may be considered the type.

Except for the delicate texture of the plants and the roughness of the leaf-lobes, the present species might be placed in the genus *Crossotolejeunea*. In fact *Trachylejeunea* and *Crossotolejeunea* have so many characters in common that the line of demarcation between them is largely artificial. The roughness in *T. dilatata* is restricted to the outer or antical surface of the lobe and to the keels of the perianth, the surface of the lobule and of the perianth between the keels being smooth. Even in the lobes the basal and median regions are smooth and the roughness is sometimes confined to a very narrow border. It is not produced by a wart-like thickening of the walls as in certain other members of the genus but is due to the fact that each cell is strongly convex or conical. Usually the walls are thin throughout, but occasionally minute trigones and very slight thickenings at the apices of the conical cells may be demonstrated. The great disparity in size between the median and marginal cells is a striking feature of the plant. The abrupt dilation of the lobe, the marginal denticulations, and the

small underleaves are characters which *T. dilatata* shares with certain species of *Prionolejeunea*, but of course its five-keeled perianth would at once exclude it from this genus.

Of the three species of *Trachylejeunea* already recorded from the West Indies, *T. prionocalyx* (Gottsche) Schiffn.* is especially close to *T. dilatata*. This species is apparently endemic to Cuba. The original material was collected by Wright, but additional specimens were lately found by Underwood and Earle on El Yunque Mountain, near Baracoa. Both species show an abrupt dilation of the lobe, thin cell-walls, an absence of ocelli, an autoicous inflorescence, and subfloral innovations. In *T. prionocalyx*, however, the plants are smaller than in *T. dilatata*, the leaves rarely exceeding 0.3 mm. in length, the margins of the lobes are crenulate rather than denticulate, and the roughness is restricted to the keels of the perianth, even the leaf-lobes being smooth except for the marginal crenulations. Here again the roughness of the keels is due to projecting cells, but these are longer than in *T. dilatata*, their walls are thicker, and their extremities are rounded rather than conical; the effect produced is one of greater roughness. The male spikes in *T. prionocalyx* are short and show only two or three pairs of bracts.

The two other West Indian species of *Trachylejeunea* are *T. Aquarius* (Spruce) Evans† and *T. Spruceana* Steph.‡ The first of these was originally described from Brazilian material but is now known also from both Puerto Rico and Cuba; the second is known only from Guadeloupe, where the type specimens were collected by L'Herminier. In *T. Aquarius* the plants are more robust than in *T. dilatata*, the leaves are ocellate at the base, the leaf-cells have large and conspicuous trigones, and the roughness affects not only the lobes and lobules but also the surface of the perianth between the keels, especially in the upper part. In the perianth the roughness is due to convex and uniformly thickened cell-walls, while in the leaves there is a large median wart arising from each cell. Even the underleaves in this species sometimes show a few scattered warts along the margin. In *T. Spruceana*

* Bot. Jahrb. 23: 592. pl. 15. f. 3-12. 1897.

† Hep. Amaz. et And. 185. 1884. See also Evans, Bull. Torrey Club 30: 561. pl. 22. f. 11-22. 1903.

‡ Hedwigia 35: 138. 1896.

the trigones are also large and the underleaves are everywhere denticulate. The species is dioicous and is described from male material; in the absence of perianths its generic position cannot be regarded as definitely established.

Another species which should also be compared with *T. dilatata* is the dioicous *Lejeunea asperrima* Spruce. Unfortunately the generic position of this plant is far from settled, because the perianths are still unknown. In the original description Spruce referred it with some question to *Priono-Lejeunea*;* he afterwards transferred it to *Harpalejeunea*† and still later distributed it in his Hepaticae Spruceanae under *Trachylejeunea*. *L. asperrima* was first described from Brazilian specimens but has since been reported by its author from the island of St. Vincent. In the abrupt dilation of its leaf-lobes, in its thin cell-walls, in its lack of ocelli and in its subfloral innovations, it agrees with both *T. dilatata* and *T. prionocalyx*. The roughness, however, is more extensive, a portion of the lobule and practically the whole of the lobe being involved. The leaf-cells are thin-walled throughout, and the roughness, as in *T. dilatata*, is due to the conical projections of the cells. The species is about as large as *T. prionocalyx*.

***Harpalejeunea reflexula* sp. nov.**

Pale or bright green, dull, scattered among other *Lejeuneae* or forming small depressed mats: stems 0.35 mm. in diameter, loosely adherent to the substratum, sparingly and irregularly pinnate, the branches widely spreading, similar to the stem: leaves loosely imbricated, the lobe obliquely spreading, strongly convex and usually reflexed or revolute at the apex, falcate, broadly ovate, 0.25 mm. long, 0.2 mm. wide, antical margin decurrent by a single cell, nearly straight near base, then strongly outwardly curved to apex, postical margin straight or slightly curved, apex gradually acuminate, usually tipped with a row of from two to four cells, margin entire or vaguely and irregularly crenulate from projecting cells; lobule ovate in outline, 0.14 mm. long, 0.1 mm. wide, abruptly contracted in outer part, otherwise strongly inflated and forming an almost spherical water-sac, keel strongly arched, forming an angle of about 90° with postical margin of lobe, free margin curved and revolute to beyond the apex, tipped with a single blunt cell; cells of lobe slightly convex, averaging 12 μ at

* Hep. Amaz. et And. 160. 1884.

† Jour. Linn. Soc. Bot. 30: 341. 1894.

the margin and $14 \times 12 \mu$ in median and basal portions, trigones small and usually distinct but sometimes confluent, intermediate thickenings occasional and usually indistinct; ocelli commonly two at base of lobe, measuring about $28 \times 18 \mu$, a few other cells with similar contents often scattered through the lobe but inconstant in number and position: underleaves distant, suborbicular from a cuneate base, 0.07 mm. long, bifid about one third with an obtuse sinus and broad, obliquely spreading lobes, each about four cells wide, three cells long and tipped with two cells side by side, margin entire or nearly so, radicelliferous disc sometimes present: inflorescence dioicous: ♀ inflorescence on a more or less elongated branch, innovating on one side, the innovation usually simple and sterile; bracts obliquely spreading (somewhat unequal in size, the one subtending the innovation smaller than the other), sharply complicate and unequally bifid, keel bearing a narrow and entire wing, lobe obovate, measuring (in larger bract) 0.4 mm. in length and 0.25 mm. in width, apex rounded to obtusely pointed, margin irregularly crenulate from projecting cells, lobule obovate, 0.35 mm. long, 0.2 mm. wide, mostly rounded at the apex, margin as in lobe; bracteole free or nearly so, obovate, 0.35 mm. long, 0.2 mm. wide, bifid about one fourth with rounded, obliquely spreading lobes and blunt sinus, margin minutely crenulate; perianth about one third exserted, obovoid, 0.6 mm. long, 0.35 mm. wide, truncate or slightly retuse at the apex with a short but distinct beak, sharply five-keeled in upper part, the keels not winged but vaguely and irregularly crenulate from projecting cells with thickened walls: ♂ inflorescence and mature sporophyte not seen. (PLATE 26, FIGURES 14-25.)

On bark of trees. Jamaica: John Crow Peak, *Evans* (88, 92). No. 88 may be designated the type.

Apparently the closest ally of *H. reflexula* is *H. uncinata* Steph.,* now known from Cuba, Santo Domingo, Puerto Rico, and Trinidad. The two species agree in size, in the form of the leaves and underleaves, and in the measurements of the leaf-cells. The bracts and perianths yield the best characters for separating them. In *H. uncinata* the margins of the lobes are distinctly toothed, and the keels of the perianth bear dentate to spinose wings, whereas in *H. reflexula* the margins of the bracts are scarcely more than crenulate, and the keels of the perianth, although sharp, are destitute of distinct wings. In the absence of floral organs the determina-

* *Hedwigia* 35: 97. 1897. See also *Evans*, *Bull. Torrey Club* 30: 549. *pl.* 20. *f.* 12-24. 1903.

tion is beset with greater difficulties. It should be noted, however, that the leaf-lobes in *H. uncinata* are less commonly reflexed than in the new species, that their apical acuminations are longer and more abrupt, that their margins are rather more distinctly crenulate, that the leaf-cells have less distinct trigones, and that the lobule, although strongly inflated, shows the free margin and apex clearly without dissection.

Two other related species are the Puerto Rico *H. subacuta* Evans* and *Lejeunea* (*Harpalejeunea*) *stricta* Lindenb. & Gottsche,† originally described from Mexican specimens but recently collected by the writer at Mabess River, Jamaica. In *H. subacuta* the lobes of the stem-leaves are rounded to subacute at the apex, in the latter case being usually tipped with a single cell; occasionally on the leaves of small branches there may be two superimposed cells at the apex, but this can hardly be regarded as a typical condition. In *L. stricta* the lobes of the leaves are a little sharper than in *H. subacuta* and often show two superimposed cells. In this species, however, the bracteole is scarcely retuse, and the keels of the perianth bear narrow, denticulate wings.

***Leiolejeunea* gen. nov.**

Plants small, neither pigmented nor glossy: stems prostrate, sparingly branched: leaves contiguous to loosely imbricated, the lobe squarrose, convex, obliquely spreading, ovate, gradually narrowed toward apex; lobule ovate in outline, strongly inflated along keel, apical tooth unicellular, sharp, hyaline papilla distal and marginal, arising from the cell next the apical tooth; cells of lobe plane or slightly convex, with local thickenings of the walls: underleaves distant, broad at apex and showing two rounded divisions separated by a shallow sinus: ♀ branch without subfloral innovations; bracts much larger than the leaves, very unequally bifid, the lobule being small and sometimes obsolete; bracteole shortly bifid; perianth slightly compressed, obovoid, distinctly beaked, destitute of keels and smooth or nearly so on surface: ♂ inflorescence short, not proliferating; bracts monandrous, imbricated, shortly and subequally bifid with rounded divisions, strongly inflated; bracteoles similar to the underleaves, limited to base of spike. (Name from *λεῖος*, smooth, and *Lejeunea*, in allusion to the perianth without keels.)

* Bull. Torrey Club 30: 547. *pl.* 20. *f.* 1-11. 1903.

† G. L. & N. Syn. Hep. 756. 1847.

The underleaves of *Leiolejeunea* agree in all essential respects with those of *Harpalejeunea*, and this peculiarity will at once serve to distinguish the genus from all the other genera of the *Lejeuneae* *Schizostipae*. The leaf-lobes and leaf-cells are also much the same as in *Harpalejeunea*, but the differential characters derived from the lobules, bracts, and perianths are so striking that the two genera could hardly be united. In *Leiolejeunea* the apical tooth of the lobule forms a continuous line with the proximal portion of the free margin, while the hyaline papilla is distal in position and slightly displaced from the apical tooth; in *Harpalejeunea* the hyaline papilla is situated at the proximal base of the apical tooth in a slight indentation. In *Leiolejeunea* the lobes of the bracts are much larger than the lobules, the latter being reduced to small basal folds; in *Harpalejeunea* the lobules are always distinct and are only a little smaller than the lobes. In *Leiolejeunea* the perianth is practically smooth, the only indications of keels being five very vague and slight elevations in the apical region; in *Harpalejeunea* the perianth develops five sharp keels. The absence of true subfloral innovations in *Leiolejeunea* and their constant presence in *Harpalejeunea* should also be emphasized in distinguishing the genera.

In the majority of the *Lejeuneae* with bifid underleaves, the hyaline papilla of the lobule is proximal in position, agreeing in this respect with *Harpalejeunea*. Both *Euosmolejeunea* and *Cheilo-lejeunea*, however, show a distal papilla, which perhaps indicates some relationship with *Leiolejeunea*. In *Euosmolejeunea* the relatively large underleaves with pointed divisions and the sharply five-keeled perianth afford distinguishing peculiarities, while in *Cheilo-lejeunea* the divisions of the underleaves are also pointed and the strongly flattened perianth shows sharp lateral keels and a more or less distinct postical keel. The genus *Leiolejeunea* is at present monotypic, being based on the following species:

***Leiolejeunea grandiflora* sp. nov.**

Dull, yellowish green, growing in depressed mats: stems 0.05 mm. in diameter, loosely adherent to the substratum, irregularly pinnate, the branches widely spreading, never microphyllous: leaves mostly more or less imbricated, the lobe falcate-ovate, 0.35 mm. long, 0.25 mm. wide, antical margin decurrent by a single

cell (as in *Harpalejeunea*), nearly straight near base, then strongly outwardly curved to apex, postical margin slightly curved, forming a shallow indentation at junction with keel, apex obtuse or rounded, margin entire or very vaguely crenulate from projecting cells; lobule 0.2 mm. long, 0.1 mm. wide, free margin revolute or appressed to lobe, sinus lunulate, forming together with the apical tooth the opening into the water-sac; cells of lobe averaging 16μ at the margin, $20 \times 16\mu$ in the middle, and $25 \times 16\mu$ at the base, trigones large and distinct, triangular, intermediate thickenings occasional, oval or rotund, sometimes confluent; ocelli none: underleaves appressed, broadly obovate, 0.12 mm. long, 0.19 mm. wide, cuneate toward base, slightly retuse at the apex, thus forming the two rounded divisions, margin faintly crenulate from projecting cells: inflorescence dioicous: ♀ inflorescence borne on a more or less elongated branch; bracts widely spreading, the lobe abruptly dilated from a narrow base, falcate, the antical margin strongly curved and much longer than the postical, ovate, 0.95 mm. long, 0.75 mm. wide, abruptly acuminate, margin sparingly and irregularly dentate with rounded or obtuse teeth, lobule linear, obtusely pointed, 0.17 mm. long, 0.03 mm. wide, sometimes obsolete, keel rounded, not winged; bracteole slightly adnate at base on both sides, ovate to ligulate, 0.6 mm. long, 0.25 mm. wide, shortly bifid at the apex with a sharp sinus and erect obtuse or rounded divisions, margin more or less crenulate from projecting cells; perianth not projecting beyond bracts, 0.7 mm. long, 0.45 mm. wide, truncate or slightly retuse at the apex: ♂ inflorescence occupying a short branch or terminal on a longer branch: neck of fertilized archegonium usually projecting through beak of perianth: capsule about 0.25 mm. in diameter; spores irregular in form but mostly oblong, greenish, about 28μ in short diameter, minutely verruculose on surface and also bearing scattered circular patches of minute radiating ridges. (PLATE 27, FIGURES 1-10.)

On bark of trees. Jamaica: Blue Mountain Peak, *Johnson* (5, 6), *Evans* (221 p. p.). No. 6 is the type specimen.

In the absence of floral organs *L. grandiflora* might easily be confused with some of the species of *Harpalejeunea* in which the leaves are blunter than is usual in this genus. Among West Indian species *H. subacuta* might be cited as an example. Of course the dissection of the lobule and the demonstration of the hyaline papilla would at once remove all doubt, but there are a few other differences which might also be noted in this connection. In *L. grandiflora* there is a more marked indentation at the junction of

the postical margin of the lobe and the keel than in *H. subacuta*, the trigones of the leaf-cells are more pronounced, and there are no basal ocelli. Even the underleaves, although built up on the same plan as in *H. subacuta*, are composed of a much larger number of cells, the divisions being often six cells long and five to seven cells wide at the base; in *H. subacuta* the divisions are usually only three cells long and four cells wide at the base.

***Odontolejeunea longispica* sp. nov.**

Brownish or yellowish green, scattered or growing in loose, depressed mats, more or less mixed with other hepatics: stems 0.1 mm. in diameter, copiously and irregularly branched, the branches widely spreading, often soon floriferous: leaves contiguous or loosely imbricated, the lobe plane or a little convex, rarely narrowly revolute along postical margin, widely spreading, slightly falcate, ovate, maximum size about 1.0×0.7 mm. but often considerably smaller, especially on the branches, antical margin scarcely arching across axis, strongly curved from base to apex, postical margin straight or slightly curved, apex broad and rounded, margin sparingly but sharply dentate or spinose except near the base, the teeth irregular, varying from projecting cells to structures five cells long and three cells wide at base, the large teeth more usual on branch-leaves, teeth along postical margin no larger than the others and sometimes obsolete; lobule subtriangular in outline, about 0.2 mm. long, inflated at base, more or less plane and appressed to lobe in outer part, free margin straight or nearly so (forming one side of the triangle), entire except for the apical tooth, the latter mostly consisting of two superimposed cells arising from a base two or three cells wide, hyaline papilla usually arising from the inner surface of one of these basal cells, sinus short and straight; lobule often poorly developed; cells of lobe plane or nearly so, averaging 17μ at the margin, $32 \times 25 \mu$ in the middle and 32μ at the base, trigones minute, triangular, intermediate thickenings frequent, narrowly elliptical, apparently never confluent: underleaves distant, orbicular, 0.2 mm. long, plane, entire or subcrenulate from projecting cells, attached by a strongly arched line and often narrowly decurrent at base: inflorescence dioicous: ♀ inflorescence usually borne on a more or less elongated branch, more rarely on a short branch, innovating on one side, the innovation short and sterile or soon again floriferous; bracts obliquely spreading, the lobules represented by minute basal folds, lobe ovate, 0.7–1.0 mm. long, 0.4–0.7 mm. wide, spinose-dentate; bract subtending innovation narrowly winged along keel; bracte-

ole free, narrowly oblong or obovate, 0.4–0.7 mm. long, 0.2–0.35 mm. wide, entire or vaguely crenulate; perianth about half exerted, obovate in outline, 1.2 mm. long, 0.8 mm. wide, cuneate toward base, broad and truncate or slightly retuse at the apex with a short beak, postical surface with a broad and low keel, smooth or with an occasional tooth near the apex, lateral wings extending to below the middle, two or three cells broad, usually bearing from four to nine teeth, those in the apical region spine-like, sometimes three or four cells long and two or three cells wide at the base, those along sides smaller and sometimes reduced to single projecting cells: ♂ inflorescence occupying a more or less elongated branch, simple or sparingly subdivided, apparently never proliferating; bracts distant to contiguous, usually in from four to twelve pairs, the lobe widely spreading, ovate, 0.5 mm. long, 0.3 mm. wide, plane or nearly so, spinose-dentate, teeth usually four or five, the apical sometimes a little larger than the others, lobule strongly inflated, ovate in outline, 0.25 mm. long, 0.17 mm. wide, free margin revolute and appressed to lobe except in apical region, the apical tooth sometimes as in the leaves but more frequently poorly developed or obsolete, sinus straight or nearly so; antheridia borne singly or in pairs; bracteoles distant, orbicular, 0.15 mm. long, entire: mature sporophyte not seen. (PLATE 27, FIGURES 11–19.)

On leaves in damp woods. Jamaica: Lapland near Catadupa, 600 m. altitude, *Harris* (11119 *p. p.*).

If the genus *Odontolejeunea* is accepted in the restricted sense recently recommended by the writer,* *O. longispica* is the third species to be definitely recorded from the West Indies, the two others being *O. lunulata* (Web. f.) Schiffn., the type of the genus, and *O. Sieberiana* (Gottsche) Schiffn. Both of these species are widely distributed in tropical America. The lobule in *O. longispica* is a little aberrant because it bears but a single tooth and because the hyaline papilla, although displaced from the margin, is often borne on a marginal cell. In all other respects the species is a typical member of the genus.

When compared with *O. lunulata*, in which the inflorescence is also dioicous, *O. longispica* is found to be much less robust. The leaves are smaller, the local thickenings of the cell-walls are less pronounced and sometimes scarcely apparent, the underleaves are more distant, much smaller, and entire. In the perichaetial

* Bull. Torrey Club 31: 183. 1904. *O. lunulata* and *O. Sieberiana* are also described and figured in this paper.

bracts the lobes are usually spinose-dentate, the teeth being larger, fewer, and more irregular than in *O. lunulata*, and the same difference is shown by the lateral wings of the perianth. The antheridial spikes yield differential characters which are even more important. Although the number of bracts which they bear is no larger than in *O. lunulata*, the spikes appear longer because the bracts are further apart and sometimes do not overlap at all. The lobes of the bracts show but few modifications when compared with ordinary branch-leaves, and the bracteoles are distant instead of being imbricated. The sexual branches in *O. longispica* scarcely adhere to the substratum because the radicelliferous discs on the underleaves are poorly developed and rarely give rise to rhizoids. Most of the peculiarities which separate the new species from *O. lunulata* will also separate it from the paroicous *O. Sieberiana*. In exceptional cases the underleaves and bracts in this species are entire and the postical surface of the perianth shows a few scattered teeth in the upper part, but the resemblance to *O. longispica* stops here. The plants are fully as robust as in *O. lunulata*, the lobules bear several teeth along the free margin, and the short male spikes have imbricated bracteoles.

Another species which bears a strong resemblance to *O. longispica* is *Phragmicoma affixa* Tayl.,* which also seems to be confined to the island of Jamaica. Through the kindness of Professor Farlow the writer has been able to examine the type material of this species from the Taylor herbarium. It grew mixed with *Radula Grevilleana* Tayl. on leaves of *Danaea alata* and consists of a few fragmentary female plants with perianths. The species should apparently be referred to *Odontolejeunea*, in spite of the fact that the leaves are much less toothed than is usual, while the wings of the perianth are either entire or subdenticulate. The double innovations which subtend the female flowers would also be somewhat aberrant in this genus. All of these peculiarities will help to separate *P. affixa* from *O. longispica*. The lobules in the two species are very similar, but in *P. affixa* there are sometimes indications of a second tooth between the apical tooth and the base; the apical tooth itself consists of only one or two cells and bears the hyaline papilla on its inner surface. The leaf-

* Ann. & Mag. Nat. Hist. 20: 380. 1847.

cells in *P. affixa* are exceedingly delicate, and the trigones are difficult to demonstrate.

Vegetative reproduction in *O. longispica* is carried on by means of leafy propagula, which are very similar to those already noted in *O. lunulata* and *O. Sieberiana*.^{*} All that were seen still attached were situated behind perigonal bracts, but it is hardly to be supposed that they are restricted to this position. The underleaves of the propagula are almost exactly the same as in *O. lunulata*, the second one showing a large radicelliferous disc with two layers of coalesced rhizoids, precisely as in that species. The leaves, however, exhibit a number of differences and are modified to an even greater degree. The first leaf is more or less reflexed and is abruptly contracted at the apex into a long point. The other marginal teeth are numerous but very minute, each one usually consisting of a single projecting cell. The second, third, and fourth leaves are also sharp-pointed at the apex, but the other teeth tend to become more scattered and larger, so that by the time the fifth leaf is reached, the distinction in size between the apical and marginal teeth is scarcely apparent. The lobules of the first four or five leaves are represented by minute basal folds, and the apex consists of a single projecting cell, which bears the hyaline papilla on its inner surface. Occasionally one of these rudimentary lobules will show vague indications of a second tooth between the apex and base, thus indicating perhaps an approach to other members of the genus. A tendency to branch is sometimes shown very soon by the propagula, and in one observed instance a male spike arose directly behind the second leaf.

***Brachiolejeunea bahamensis* sp. nov.**

Dull green, varying to brown or almost black, scattered or growing in depressed mats: stems 0.14 mm. in diameter, sparingly and irregularly pinnate, the branches all conforming to the *Lejeunea* type, obliquely to widely spreading, similar to the stem or with somewhat smaller leaves, never microphyllous: leaves imbricated, the lobe suberect and convolute about the stem when dry, widely spreading and more or less squarrose when moist, slightly falcate, convex, oblong-ovate, 0.9 mm. long, 0.5 mm. wide, rounded to subcordate at base, antical margin strongly out-

^{*} Bull. Torrey Club 31: 191. 1904.

wardly curved to the rounded or obtuse apex, postical margin slightly curved, margin everywhere entire; lobule ovate-triangular in outline, 0.5 mm. long, 0.25 mm. wide, the inflated portion forming a conical water-sac extending along the keel and about half as long as the lobe, keel straight or slightly arched, distinctly indented in outer part and usually forming a continuous line with postical margin of lobe, free margin rounded or subcordate at base, appressed to lobe for about two thirds its length and then passing by a straight or very shallow sinus into the postical margin of lobe, appressed portion usually with five or six teeth, the innermost rounded, the others (including the outermost or apical) mostly three or four cells long and one or two cells wide at base, often curved toward the surface of lobe, hyaline papilla at proximal base of outermost tooth, slightly displaced from the margin but sometimes borne on the antical surface of a marginal cell; cells of lobe plane or a little convex, averaging $13\ \mu$ at the margin, $25 \times 18\ \mu$ in the middle and $30 \times 23\ \mu$ at the base, trigones distinct, triangular but usually with one concave and two convex sides, intermediate thickenings infrequent, oval: underleaves loosely imbricated, plane, broadly orbicular, 0.35 mm. long, 0.4 mm. wide, rounded to minutely auriculate at the base, rounded to truncate at the apex, margin entire: inflorescence autoicous: ♀ inflorescence usually borne on a more or less elongated branch, more rarely on a very short branch, innovating on both sides, rarely on but one, the innovations widely spreading, sterile or soon again floriferous; bracts obliquely spreading, sharply complicate with a narrow and entire wing along keel, lobe broadly ovate, 0.8 mm. long, 0.5 mm. wide, obtusely pointed, irregularly sinuate, lobule oblong, 0.4 mm. long, 0.12 mm. wide, adnate for most of its length, apex obtuse, acute, or apiculate; bracteole free or nearly so, oval or oblong, 0.7 mm. long, 0.4 mm. wide, rounded to truncate at the apex; perianth about half exserted, ovoid, 0.9 mm. long, 0.5 mm. wide, cuneate toward base, rounded to truncate at apex with a short beak, scarcely compressed, ten-keeled (four antical, four postical, and two lateral), the keels rounded, extending to the middle or below: ♂ inflorescence usually on a leading branch, terminal or becoming intercalary by proliferation; bracts imbricated, mostly in from three to ten pairs, diandrous, similar to the leaves but with more obliquely spreading, shorter lobes and relatively broader and more inflated lobules, the free margins of the latter being more irregularly toothed, keel strongly arched; bracteoles imbricated, similar to the underleaves: capsule 0.4 mm. in diameter; spores minutely verruculose, about $40\ \mu$ in diameter. (PLATE 28, FIGURES 1-14.)

On bark of trees. Abaco: Old Kerr's Point, *Brace* (2027 *p. p.*). New Providence: junction of Southeast and Soldiers' roads, *Coker* (1 *p. p.*); ten miles west of Nassau, *Coker* (2); Grant's Town, *E. G. Britton* (562); north slope of Blue Hills, *E. G. Britton* (584); Fox Hills path, *Britton & Millspaugh* (2090); near Tea House, *E. G. Britton* (3191). Watling's Island: Cockburn Town and vicinity, *Britton & Millspaugh* (6120). Crooked Island: road to Vauxhall, *Brace* (4746); Stopper Hill, *Brace* (4816). Cuba: Matanzas, *Britton & Wilson* (81). All of these localities except the last are in the Bahamian archipelago. No. 4816, from Crooked Island, may be designated the type.

When this species was first studied by the writer it was referred to *B. corticalis* (Lehm. & Lindenb.) Schiffn., and it is cited under this name by Coker in the only list of Bahamian Hepaticae which has yet been published.* The two plants resemble each other very closely in general appearance, in size, in color, in the form of the leaves and underleaves, and in the structure of the leaf-cells. They differ in inflorescence, *B. corticalis* being dioicous, and in certain characters derived from the lobules, the underleaves, and the floral organs. In *B. bahamensis* the free margin of the lobule usually bears five teeth, each three or four cells long, and the underleaves are rounded or minutely auriculate at the base; in *B. corticalis* the free margin of the lobule usually bears only four teeth, each one or two cells long, and the underleaves either have subparallel sides or are cuneate at the base. In *B. bahamensis* the divisions of the perichaetial bracts are narrowed toward the apex and more or less acute, while the lobule, which is much shorter than the lobe, is adnate for the greater part of its length; in *B. corticalis* the divisions of the bracts are rounded at the apex, and the lobule, which is nearly as long as the lobe, projects considerably beyond the keel. In *B. bahamensis* the perianth seems to be constantly ten-keeled, while in *B. corticalis* the number of keels varies from five to eight. The new species is also remarkable because all of its branches, so far as observed, conform to the *Lejeunea* type, while in *B. corticalis* branches of the *Frullania* type are not infrequent.

* In Shattuck: The Bahaman Islands 248. 1905. The true *B. corticalis* has since been collected on the island of Great Bahama and on Cat Island by Britton and Millspaugh (2533, 2646, 2719, 2723, 5899).

On account of its ten-keeled perianth *B. bahamensis* belongs to a group of four closely related American species, all characterized by this peculiarity. The other species belonging to this group are *B. densifolia* (Raddi) Evans, *B. chinantlana* (Gottsche) Schiffn., and the recently described *B. insularis* Evans.* *B. densifolia* is widely distributed in South America and has also been reported from the West Indies; *B. chinantlana* was originally described from Mexican specimens but has recently been found in the mountains of Jamaica; *B. insularis* is known from Cuba, Jamaica, and Puerto Rico. Of these four species *B. densifolia* and *B. chinantlana* are at once distinguished from *B. bahamensis* by their larger size and more or less pointed leaves; *B. densifolia* is further characterized by being dioicous, and *B. chinantlana* by being paroicous. In *B. insularis* the inflorescence is also paroicous, but this species comes much closer to *B. bahamensis* than the others on account of the rounded lobes of its leaves. It is, however, more robust, many of the vegetative branches conform to the *Frullania* type, the basal auricles of the underleaves are much better developed, and the margins of the lobules have more numerous and often more irregular teeth.

***Symbiezidium laceratum* sp. nov.**

Brownish green, growing in depressed mats, similar in general appearance to *S. transversale*: stems 0.15 mm. in diameter: leaves imbricated, the lobe obliquely spreading, sometimes plane, sometimes slightly convex along antical border and concave along postical, rarely revolute at the apex, scarcely falcate, ovate-oblong, 1.2–1.3 mm. long, 0.7–0.75 mm. wide, antical margin rounded at base and arching partially across axis, then slightly outwardly curved to the broad and rounded apex, postical margin straight or nearly so, margin entire or irregularly sinuous in apical region; lobule when well developed ovate-lanceolate in general outline, 0.3 mm. long, 0.15 mm. wide, strongly inflated in basal half; cells of lobe averaging $23\ \mu$ at the margin, $30\ \mu$ in the middle, and $35 \times 30\ \mu$ at the base, trigones and intermediate thickenings conspicuous: underleaves imbricated, plane or nearly so, broadly orbicular, 0.7 mm. long, 0.95 mm. wide, sometimes abruptly cuneate and short-decurrent at base but usually with the margin in this region straight and meeting the axis at approximately a right angle, apex broad, rounded or truncate, often slightly sinuous, margin otherwise

* For notes on these species, see Evans, Bull. Torrey Club 35: 158–161. 1908.

entire: inflorescence autoicous: ♀ inflorescence arising from the stem or from a leading branch; bracts obliquely to widely spreading, complicate, sometimes with a narrow and entire wing along keel, lobe oblong to obovate, 0.75 mm. long, 0.4 mm. wide, rounded at apex, lobule similar to lobe and of about the same size, rounded to obtuse at the apex; bracteole obovate, 0.7 mm. long, 0.4 mm. wide, rounded to truncate at apex; perianth about half exerted beyond the bracts, obovate, 1.2 mm. long, 0.85 mm. wide, rounded to truncate at apex with a short beak, lateral keels winged to about the middle, the wings coarsely and irregularly laciniate or lacerate to within from one to three cells of the keels, the laciniae straight or variously curved and contorted, rarely branched, usually from five to ten cells long and two cells wide at base or to beyond the middle, antical surface of perianth smooth, postical surface bearing an indefinite number of scattered laciniae, some of them often arranged in two interrupted longitudinal lines, apparently representing the two angles of an obsolete postical keel: ♂ inflorescence occupying a short lateral branch or terminal on a longer branch, occasionally borne on a subfloral innovation, apparently never proliferating; bracts in from two to six pairs, imbricated, subequally bifid, both lobe and lobule somewhat narrowed toward the rounded apex, keel not winged but slightly crenulate from projecting cells; bracteoles restricted to base of spike, similar to the underleaves but smaller: mature sporophyte not seen. (PLATE 28, FIGURES 15-20.)

On bark of trees. Hayti: Plaisance to Marmelade, 800 m. Nash (654).

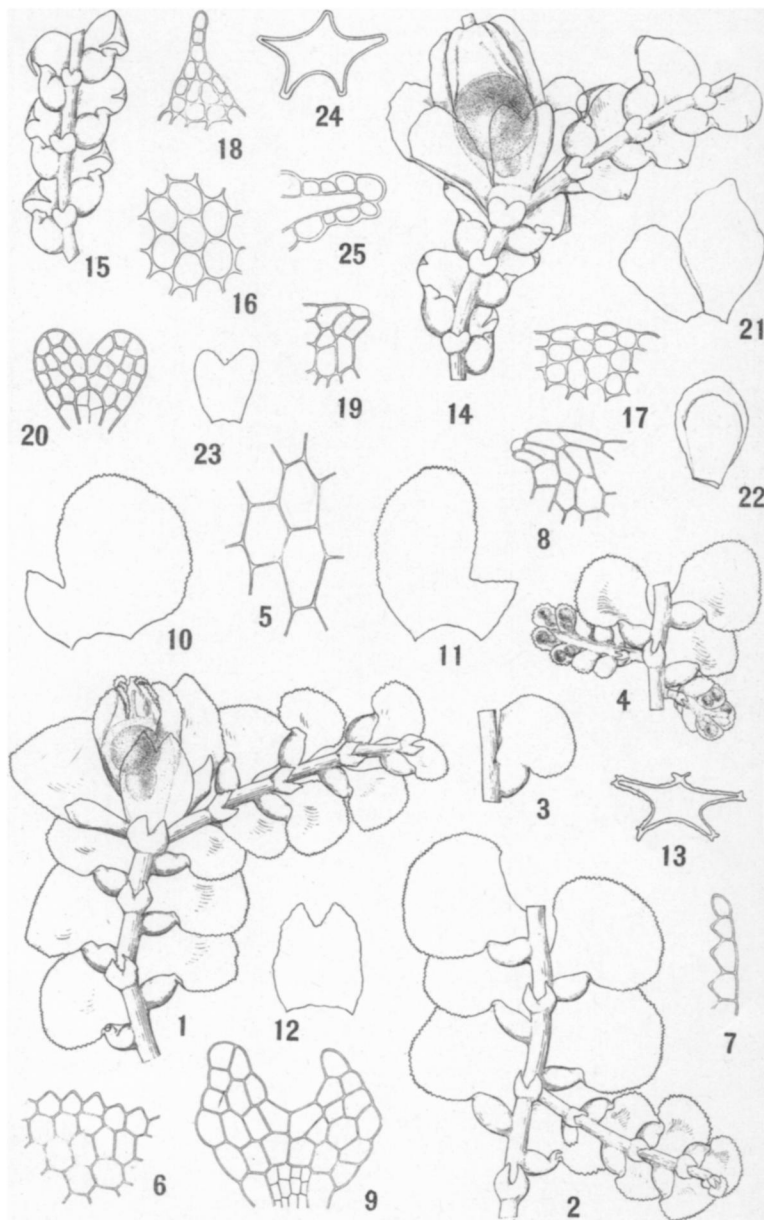
In its autoicous inflorescence *S. laceratum* agrees with *S. barbiflorum* (Lindenb. & Gottsche) Evans, *S. vincentinum* (Gottsche) Trevis.,* and *Platylejeunea Kroneana* Steph.,† the four together constituting a group of closely related species. *S. barbiflorum* and *S. vincentinum* are rather widely distributed in tropical America and both occur in the West Indies. *P. Kroneana* is known only from the original material, collected by Krone at Santa Caterina, Brazil. This last species is erroneously described as dioicous, but a portion of the type specimen kindly communicated by its author is clearly autoicous and is so labeled on the packet. In distinguishing these four species from one another the most important characters are drawn from the bracteoles and perianths, but the leaves and underleaves sometimes yield a few supplementary differences.

* See Evans, Bull Torrey Club 34: 540-543. pl. 31. f. 11-14. 1908.

† Hedwigia 35: 117. 1896.

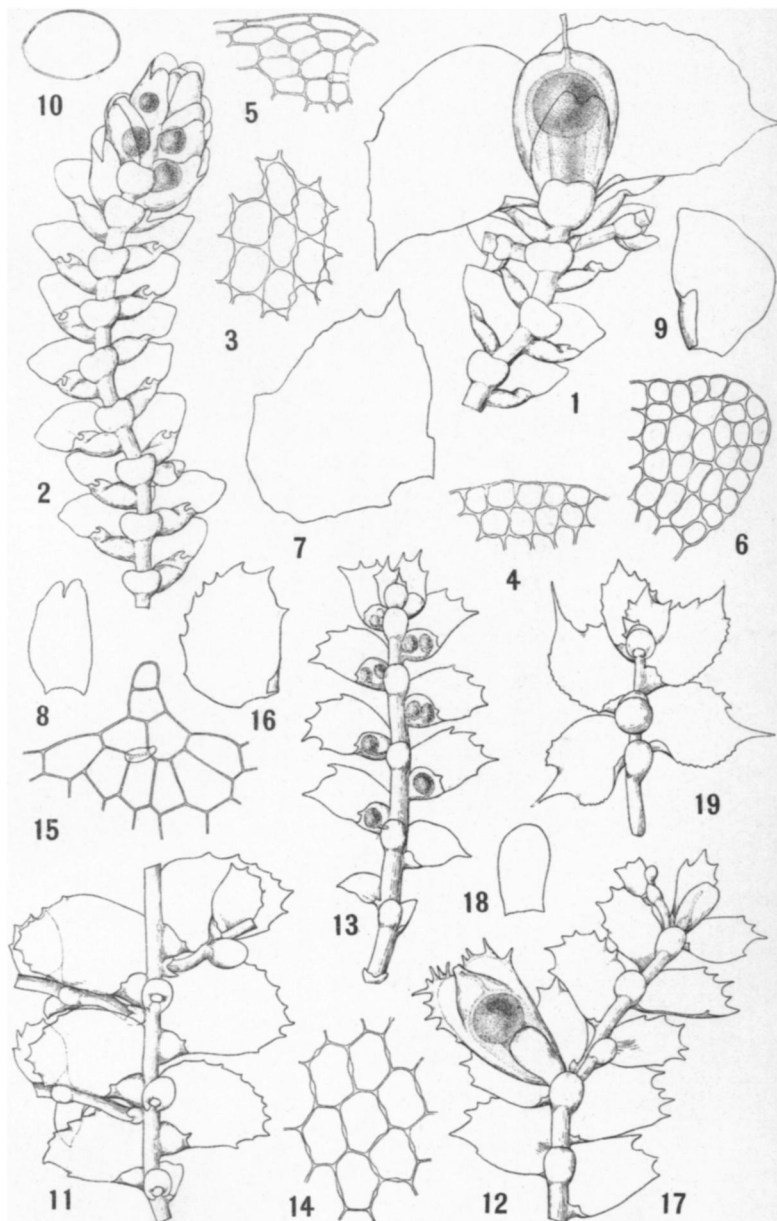
In *S. barbiflorum*, which is especially close to the Haytian species, the underleaves are constantly long-decurrent, and the bracteole is distinctly bifid. The two species agree in developing many laciniae on the postical surface of the perianth, but these laciniae are even more numerous in *S. barbiflorum* than in *S. laceratum* and are also characterized by being shorter and more delicate. In *S. vincentinum* the underleaves are usually broader than long, agreeing in this respect with *S. laceratum*, but they differ in being constantly decurrent. Occasionally the leaves in this species are apiculate as earlier authors have emphasized, but this condition is far from constant and many plants bear rounded leaves only. The bracteole is retuse, irregularly sinuous-crenate, or emarginate at the apex, and the perianth is either smooth on the postical surface or bears only a few scattered laciniae. The laciniae along the lateral keels tend to be shorter and less numerous than in *S. laceratum*. In *Platylejeunea Kroneana* the underleaves are also decurrent as in *S. vincentinum*, but the bracteole is undivided as in *S. laceratum*. The lateral laciniae of the perianth, however, are reduced to spine-like teeth and the postical surface is smooth or nearly so. In this species the lobules of the perigonal bracts tend to be acute or apiculate instead of rounded, but this is a difference which may well be inconstant. In the remaining species of *Symbiezidium* known from the West Indies the inflorescence is dioicous.

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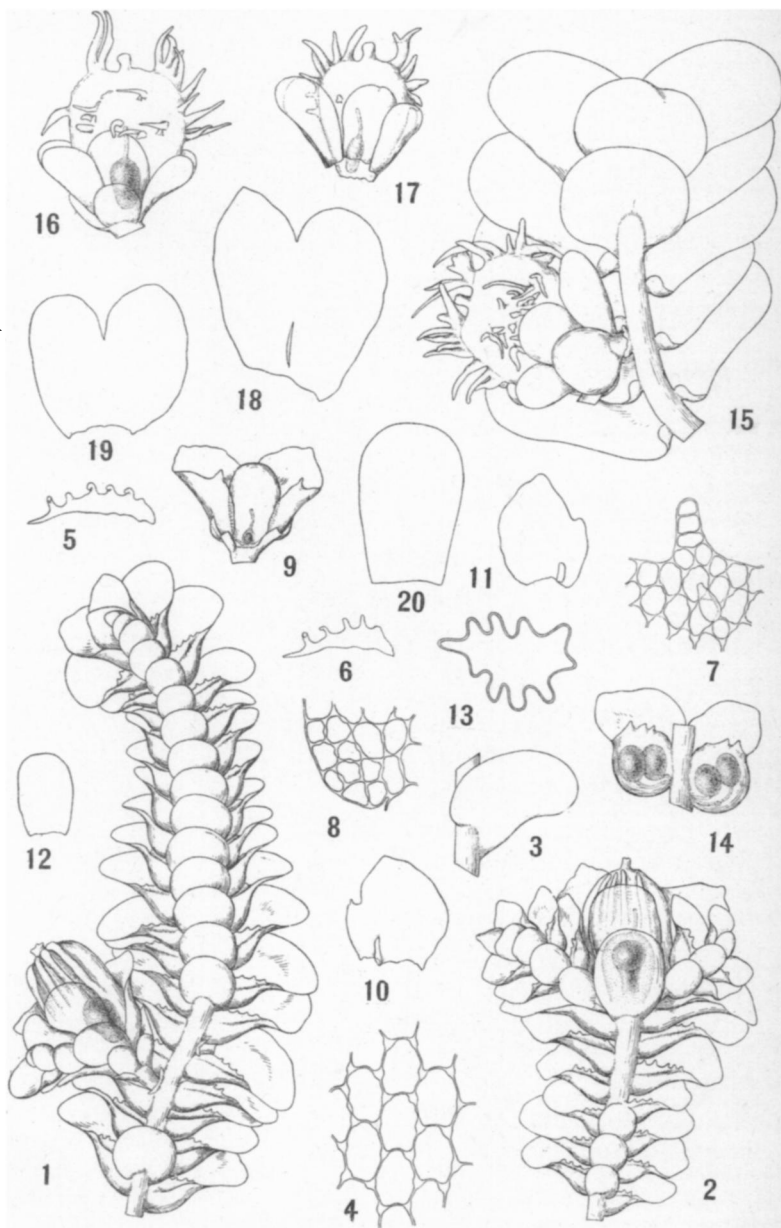
1-13. *TRACHYLEJEUNEA DILATATA* Evans

14-25. *HARPALEJEUNEA REFLEXULA* Evans



1-10. *LEIOLEJEUNEA GRANDIFLORA* Evans

11-19. *ODONTOLEJEUNEA LONGISPICA* Evans



1-14. *BRACHIOLEJEUNEA BAHAMENSIS* Evans

15-20. *SYMBIEZIDIUM LACERATUM* Evans

Explanation of plates 26-28

The figures were all drawn by the writer and prepared for publication by Miss Hyatt.

PLATE 26.

Trachylejeunea dilatata Evans. 1. Part of plant with perianth, postical view, $\times 35$. 2. Part of stem with branch, postical view, $\times 35$. 3. Leaf, antical view, $\times 35$. 4. Part of plant with two male inflorescences, postical view, $\times 35$. 5. Cells from middle of lobe, $\times 265$. 6. Cells from antical margin of lobe seen from postical surface, $\times 200$. 7. Cells from margin of lobe in cross section, $\times 200$. 8. Apex of lobule, $\times 200$. 9. Underleaf, $\times 200$. 10-12. Bracts and bracteole from a single involucre, $\times 35$. 13. Transverse section of perianth in upper third, $\times 45$. The figures were all drawn from the type specimen (311).

Harpalejeunea reflexula Evans. 14. Part of plant with perianth, postical view, $\times 45$. 15. Part of stem, postical view, $\times 45$. 16. Cells from middle of lobe, $\times 265$. 17. Cells from antical margin of lobe, $\times 200$. 18. Apex of lobe, $\times 200$. 19. Apex of lobule, $\times 200$. 20. Underleaf, $\times 200$. 21-23. Bracts and bracteole from a single involucre, $\times 45$. 24. Transverse section of perianth, 45. 25. Lateral keel of perianth in section, $\times 200$. The figures were all drawn from the type specimen (88).

PLATE 27.

Leiolejeunea grandiflora Evans. 1. Part of plant with perianth and the bases of two branches, postical view, $\times 35$. 2. Part of plant with male inflorescence, postical view, $\times 35$. 3. Cells from middle of lobe, $\times 265$. 4. Cells from antical margin of lobe, $\times 200$. 5. Apex of lobule, $\times 200$. 6. Half of underleaf, $\times 200$. 7, 8. Bract and bracteole from the same involucre, $\times 35$. 9. Bract from an unfertilized inflorescence, $\times 35$. 10. Transverse section of perianth, $\times 35$. The figures were all drawn from the type specimen (6).

Odontolejeunea longispica Evans. 11. Part of stem with the bases of three branches, postical view, $\times 25$. 12. Female branch with perianth and innovation, postical view, $\times 25$. 13. Short antheridial spike, postical view, $\times 25$. 14. Cells from middle of lobe, $\times 200$. 15. Apex of lobule, $\times 200$. 16-18. Bracts and bracteole from the same involucre, $\times 25$. 19. Propagulum, postical view, $\times 25$. The figures were all drawn from the type specimen (11119 p. p.).

PLATE 28.

Brachiolejeunea bahamensis Evans. 1. Part of plant with perianth and proliferating antheridial spike, postical view, $\times 25$. 2. Branch with perianth, postical view, $\times 25$. 3. Leaf, antical view, $\times 25$. 4. Cells from middle of lobe, $\times 265$. 5, 6. Free margins of lobules, 45. 7. Apical tooth of lobule, $\times 200$. 8. Basal auricle of underleaf, $\times 200$. 9. Unfertilized female flower, the innovations dissected away, postical view, $\times 25$. 10-12. Bracts and bracteole from the same involucre, $\times 25$. 13. Transverse section of perianth, $\times 25$. 14. Perigonal bracts with antheridia, postical view, $\times 45$. Figs. 2 and 14 were drawn from specimens collected by E. G. Britton (584), the remaining figures from the type specimen (4618).

Symbiezidium laceratum Evans. 15. Part of plant with perianth, postical view, $\times 25$. 16. Female branch, postical view, $\times 25$. 17. Involucre and perianth, postical view, $\times 25$. 18-20. Bracts and bracteole from the same involucre, $\times 45$. The figures were all drawn from the type specimen (654).